Central and Southeast Texas Recreational Use-Attainability Analyses Project
Steele Creek (Segment 1209K) Basic RUAA

Results Report

Contract No. 582-9-90440

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October 7, 2010

PREPARED IN COOPERATION WITH THE
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

The preparation of the report was financed through grants from the U.S. Environmental Protection Agency through the Texas Commission on Environmental Quality

Federal Grant #07-09 106 Categorical Water Pollution Control 98665304 (State USAS Grant #998807)

Federal Grant #09-11 106 Categorical Water Pollution Control 98665305 (State USAS Grant #998810)

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Introduction

Problem Statement

Recreational Use-Attainability Analyses (RUAAs) are scientific assessments that are used to determine existing and attainable recreational use for a water body and determine if that use might be different than the presumed recreational use, as specified in the Clean Water Act. In September 2009, a Basic RUAA was initiated on Steele Creek, Segment 1209K. This Basic RUAA Report will provide the Texas Commission on Environmental Quality (TCEQ) Standards Group with relevant information to help determine the appropriate attainable recreation use for Steele Creek. The completion of this Basic RUAA consisted of several important interrelated components including 1) reconnaissance and site selection, 2) Basic RUAA and 3) public outreach. The objectives of each component are listed below.

Objectives

1. Reconnaissance and Site Selection

The primary objective of this phase is to select survey sites that would be accessible to users and most likely characterize recreational uses in the watershed. This was accomplished primarily with the input of local, state and regional agency staff familiar with the watershed, as well as aerial imagery. An initial stakeholder meeting occurred on March 9, 2010 at the Navasota Center, Navasota TX. Reconnaissance surveys were conducted on January 12 and 13, 2010 and provided the basis site selection for discussion in this meeting.

2. Basic Recreational Use Attainability Analysis

The primary objective of the Steele Creek RUAA was to characterize the recreational use and potential impediments to use for this stream. The RUAA field surveys were conducted on Friday, May 28, 2010 to collect information on the water body and associated uses. These field

surveys were conducted at selected sites with the highest probability of detecting recreation use. The objective was to document and characterize observed use, site conditions (hydrology, physical attributes), and weather during the survey the RUAA field surveys.

3. Public Participation

The objective of the public participation phase of the Basic RUAA was to solicit as much information from various watershed stakeholders including agency staff, citizens, recreational user groups and other interested parties on the historical and current recreational uses in Steele Creek. This included soliciting information on recreational uses by sending out emails to key organizations and staff familiar with the watershed. The stakeholder contact list is provided in Appendix 1. In addition, on March 9, 2010 a stakeholder meeting was held to gather information on the watershed including likely recreational access points.

Study Area

Description of Water Body

Steele Creek is a tributary to the Navasota River watershed, which is located within the Brazos River Basin. Segment 1209K is an unclassified segment by the TCEQ and is approximately 45.6 miles in length. Segment 1209K begins at the confluence the Navasota River in Robertson County and continues to a point 2.4 miles upstream of FM 147 in Limestone County (TCEQ, 2008). Steele Creek traverses mostly level terrain with local shallow depressions, supporting water-tolerant hardwood, conifers, and grasses in its clay and sandy loams (Handbook of Texas, 2010). Steele Creek (Segment 1209K) is on the state's 303(d) list for geometric mean values that exceed the bacteria criteria associated with primary contact recreation uses (TCEQ, 2008).

Environmental Features and Population Characteristics

The climate in the Navasota River Watershed is classified as having hot, humid summers and mild winters. Steele Creek has been disturbed by human activities that have altered both the land use and vegetation cover of the watershed. These activities include the construction of roads and instream sewer lines, conversion of land for agriculture, and the building of commercial businesses and residential neighborhoods. The area can be described as rural with a very sparse population density.

Watershed Characterization

The Navasota River watershed traverses flat to rolling terrain with local shallow depressions, surfaced by clay and sandy loams that support water-tolerant hardwoods, conifers, and grasses. The riparian zone is minimally impacted by development. The watershed of Steele Creek is predominantly rural with agriculture being the primary land use.

Permitted Discharges (Municipal, Industrial, Stormwater)

Steele Creek is affected by storm water runoff from agricultural, industrial, and urban areas. Under TPDES, the TCEQ has issued eight permits to discharge treated wastewater to the Segment 1209K watershed (Figure 1). The permits are held by Oak Grove Mining Co., LLC (2), U.S. Silica Co. (5), and the City of Thornton (1).

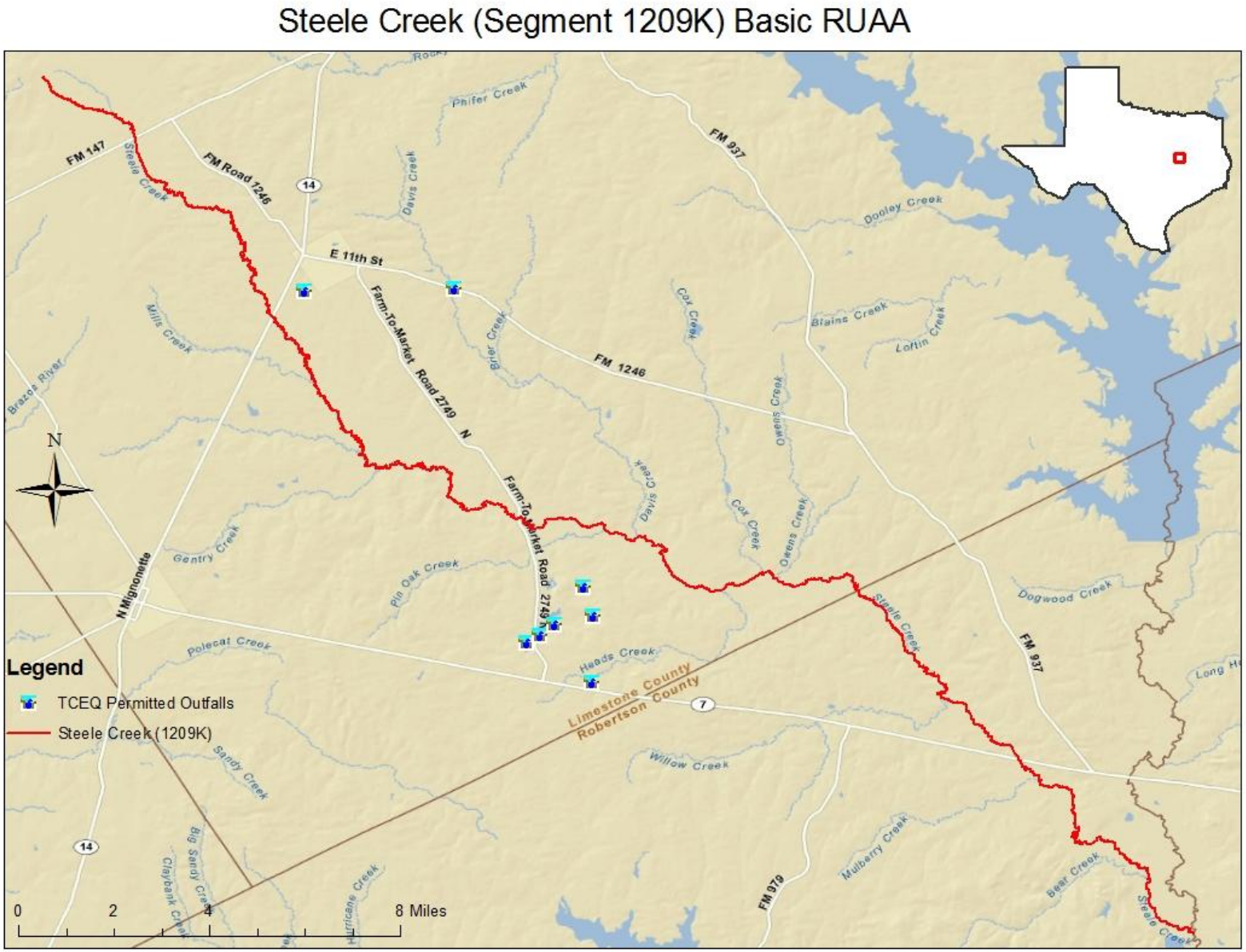

Figure 1. TCEQ permitted outfalls adjacent to Steele Creek, Segment 1209K.

Potential Nonpoint Sources

Potential sources of nonpoint source pollution in the watershed include municipal point source discharges, on-site sewage facilities, and runoff from agricultural. For any urban collection and treatment system, sanitary sewer overflows and WWTF bypasses are possible sources of bacteria loadings to receiving waters. Steele Creek (Segment 1209K) watershed can be described as relatively rural. There are potentially a number of on-site sewage facilities (OSSFs or septic systems) in use in the watershed. OSSFs require routine repairs and maintenance to avoid failures causing potential leaks or overflows. Poorly maintained OSSFs are a potential source of bacteria loadings into Steele Creek.

Site Reconnaissance Summary

Perspective sites were chosen based on public access and documented uses from the stakeholder response to the request for information e-mail, which is included in Appendix 1. Initial reconnaissance surveys were conducted on January 12 and 13, 2010. A total of twelve perspective sites were visited (Table 1). Of these, three were on private property. The remaining nine were publicly accessible and chosen for field survey sites (Table 2). Site suggestions were submitted to TCEQ as part of the Quality Assurance Project Plan's (QAPP) Monitoring Plan, which was approved by TCEQ on May 27, 2010.

Table 1. Site reconnaissance for Basic RUAA on Steele Creek, Segment 1209K.

Recon Site	Description	Latitude	Longitude	Public Access	Water Access	Recommended Site
1	FM 147 @ Steele Creek	31.44860	-96.63249	Can park on any side of road	Fences along water up and across water down	Yes
2	LCR 648 @ Steele Creek	31.43025	-96.61761	Can pull off but not much room on side of road	Easy slope on downstream left side of bridge	Yes
3	LCR 656 @ Steele Creek	31.41837	-96.60062	Not really any place to park	Fence, road to road downstream left and right, and lots of debris/veg. upstream	Yes
4	SH 14 @ Steele Creek	31.39349	-96.59113	Can pull off to side of bridge upstream, left and right	Downstream, right bank easy slope	Yes
5	LCR 722 @ Steele Creek	31.38005	-96.58057	Not anywhere to park on road	Pretty steep banks	Yes
6	Moss Springs Rd @ Steele Creek	N/A	N/A	No access	N/A	No
7	FM 2749 @ Steele Creek	31.33292	-96.51594	Can pull off any side of road	Fenced on right bank and downstream/left bank, heavy vegetation	Yes
8	LCR 730 @ Steele Creek	N/A	N/A	Locked gate "No Trespassing	N/A	No
9	CR 477 @ Steele Creek (TCEQ Site: 16384)	31.30616	-96.40674	Can park on any side of road	Can reach edge of bank but slight drop to water	Yes
10	SH 7 @ Steele Creek	31.26015	-96.36591	Can pull off on left bank, upstream or downstream	Easy slope at bridge on left bank	Yes
11	CR 472 @ Steele Creek	31.24689	-96.35002	No where to pull off	Pretty steep drop to water	Yes
12	Camp Cooley @ Steele Creek	31.18263	-96.35596	Private roads	N/A	No

Table 2. Field survey sites for the Basic RUAA on Steele Creek, Segment 1209K (corresponding to Figure 2 and Table 1).

Recon Site	Field Survey Site	Description	Latitude	Longitude	Approx. River Mile
1	1	FM 147 @ Steele Creek	31.44860	-96.63249	38.2
2	2	LCR 648 @ Steele Creek	31.43025	-96.61761	36.1
3	3	LCR 656 @ Steele Creek	31.41837	-96.60062	34.2
4	4	SH 14 @ Steele Creek	31.39349	-96.59113	31.5
5	5	LCR 722 @ Steele Creek	31.38005	-96.58057	29.7
7	6	FM 2749 @ Steele Creek	31.33292	-96.51594	20.2
9	7	CR 477 @ Steele Creek (TCEQ Site: 16384)	31.30616	-96.40674	11.4
10	8	SH 7 @ Steele Creek	31.26015	-96.36591	6.6
11	9	CR 472 @ Steele Creek	31.24689	-96.35002	5.0

Methodologies

RUAA Survey Site Selection and Descriptions

Steele Creek flows through mostly rural areas held by largely private property owners. The target density of survey sites should be approximately three (3) sites per every five (5) miles of stream (TCEQ, 2009). During our study, survey sites were established in areas where the water body is accessible to the public and has the highest potential for recreational use (road crossings, public lands/parks located near the water body, and populated areas). A total of nine (9) survey sites were established (Table 2 & Figure 2). These sites were chosen based on public access potential and also providing sufficient spatial coverage throughout the segment. In portions where the recommended three (3) sites per every five (5) miles of stream was not possible, supplementary information was gathered through coordination with local authorities, conducting interviews, and using topographic maps and aerial photos.

Every effort was made to obtain supplementary recreational use information about the entire length of the segment, including areas other than the selected sites in this Basic RUAA.

Topographic maps and aerial imagery were used to provide the needed geographic information about potential recreational opportunities, potential access points, and potential access obstacles along the Steele Creek. Review of these resources resulted in reconnaissance site selection. The subsequent reconnaissance site visits confirmed the limited public access along the Steele Creek. Fences, gates, and no trespassing signage are common public access limitations on the segment and resulted in less than three (3) sites for every five (5) miles of stream. Figure 3 photographs were taken during the field survey depicting the various physical conditions observed along Steele Creek.

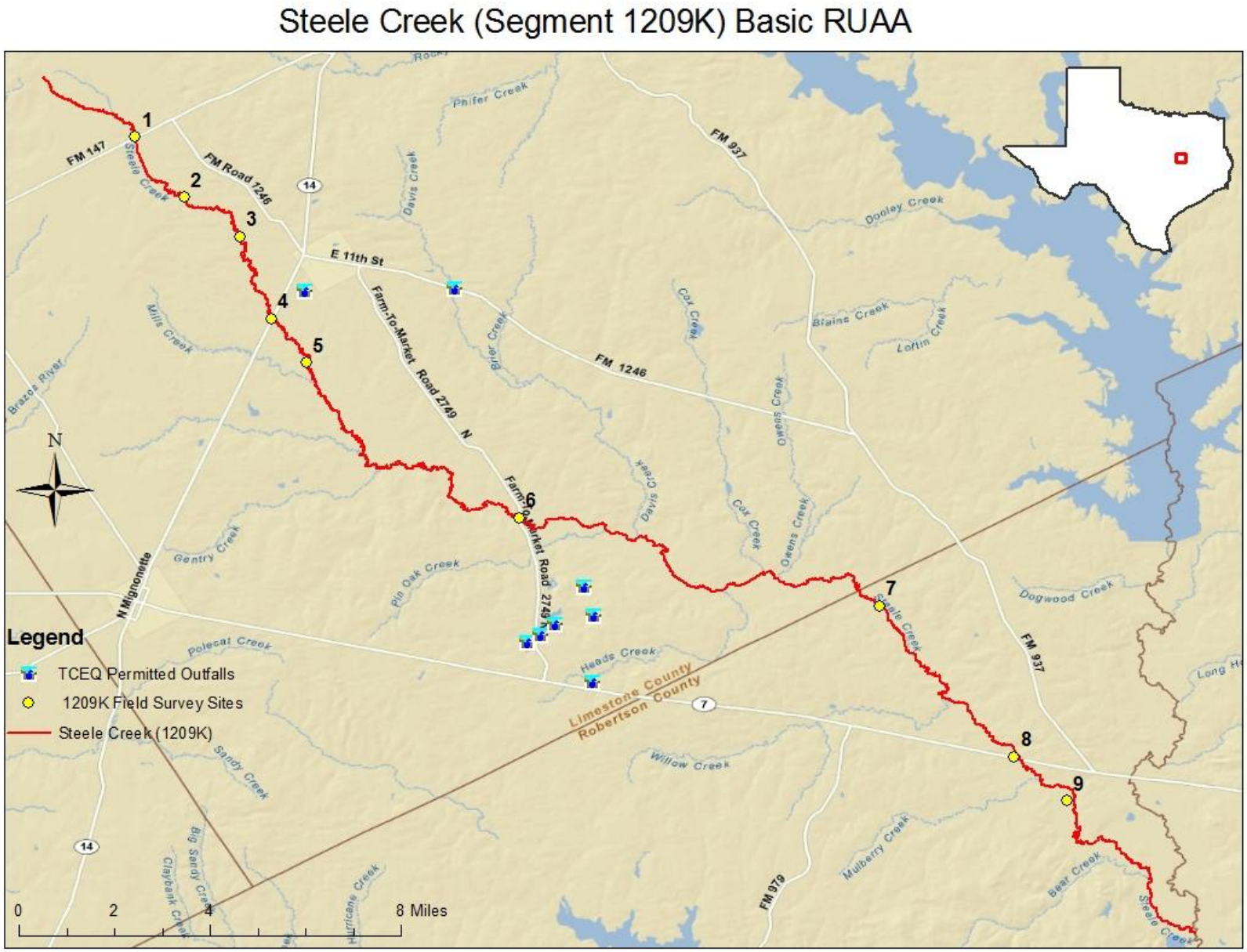

Figure 2. Basic RUAA survey sites on Steele Creek, Segment 1209K, selections based on river mile/assessment units, accessibility, and recreational features.

Figure 3. Pictures taken at field survey sites 1, 5, 7, and 8 that depict the various physical characteristics observed along Steele Creek, Segment 1209K.

Sampling Methods

RUAAs are used to identify and assign attainable uses and criteria to individual water bodies. Applicable uses and associated criteria are defined in the Texas Surface Water Quality Standards (TSWQS). Until recently, Texas had two recreation use categories in the 2000 TSWQS: contact and noncontact recreation. These recreation use categories were expanded to include more categories: primary contact, and secondary contact recreation (1 & 2). Primary contact recreation consists of recreational activities involving a significant risk of ingestion of water including: wading by children, swimming, water skiing, diving, and surfing. Secondary contact recreation 1 is considered water recreation activities not involving a significant risk of water ingestion: including fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity. Secondary contact recreation 2 follows the same definition as secondary contact recreation 1 except that it occurs less frequently due to (1) physical characteristics of the water body and/or (2) limited public access.

According to TCEQ agency guidance, a Basic RUAA must be conducted on Steele Creek since it is an unclassified water body (Segment 1209K). RUAA surveys were conducted during the normal warm season and periods when people would be most likely use the water body for contact recreational purposes. RUAA surveys were also conducted during optimal sampling conditions that are representative of the normal flow conditions of the stream and are not storm-influenced. RUAA field surveys for Steele Creek (Segment 1209K) were conducted on Friday, May 29, 2010. Weather conditions for this day and the previous 30 days can be found Appendix 4. More specific procedures can be found in *TCEQ's RUAA Procedures Document, May 2009.*

Field Survey Descriptions

A Basic RUAA field survey begins with marking off a 300 meter (m) reach of the waterway, flagging every 30m. Sites with public accessibility limitations may not be fully assessed in this way. In instances such as these, a laser range finder was used to document the length of the stream reach that could be observed. A flow measurement (where possible) was then taken within the 300m stream reach. If the waterbody is wadeable, a depth measurement was taken every 30m and width measurements are taken at the widest, narrowest, and average width points within the 300m reach. The depth measurements for the sites that were considered non-wadeable were taken from the bridge at the deepest point accessible. Pictures are taken to document the survey at 30, 150, and 300m facing upstream, right bank, downstream, and left bank (Appendix 3). Air temperature and water temperature were also recorded at an easily accessible location. Finally, the Basic RUAA datasheets were completed to document any recreational uses, signs of recreational use, impeding conditions, or other field notes taken during the field survey.

Due to impediments affecting stream access, complete field survey methods were not possible at some locations on Steele Creek. Impediments to stream access, such as steep banks fences, log jams, and overgrown banks, at times limited the field survey team's ability to survey the complete 300m stretch of stream. In each case where this was a factor, the impediments were documented on the field data sheet and documenting pictures of these conditions were taken (Appendix 3). Specific impediments causing access constraints for each site can be found in Appendices 2 and 5.

Results

The field survey site visit was completed on each of the nine sample sites on Friday, May 29, 2010. All field data sheets are attached (Appendix 2).

Physical Evaluation and Flow

During the field surveys, the air and water temperatures fell within the range of acceptable temperatures for sampling described in the TCEQ procedures manual (Table 3). The average depth of Steele Creek was 0.5m and the average width is 4.8m. The average secchi tube reading taken at the field survey sites was 0.3m (Table 3). The flow taken at field survey site 6 was 0.17 cubic feet per second (cfs) and site 8 was 10.63cfs. Flow was not taken at any other field survey sites during the Basic RUAA because of access restrictions and depth, however in the upstream extent of the segment the flow was described as a slow trickle.

Steele Creek riparian zone can be generalized as mainly forest and pasture (Table 4). The dominant substrate along the creek was generally composed of mainly sand and mud/clay.

Recreational Uses

Based on our field surveys, we did not personally observed recreation on Steele Creek (Segment 1209K). We observed evidence of both water related activities (fishing tackle) at field survey site 2 and non-water related activities; foot path/prints at site 6, and RV/ATV tracks at site 7 (Table 5, Figure 4, & Appendix 5). There were many noted impediments along Steele Creek that could limit the recreation including: private property, steep slopes, fences, debris in the water, and log jams (Table 5, Figure 4, & Appendix 5).

Table 3. Physical parameters from the basic recreational use attainability analysis field surveys conducted on Steele, Segment 1209K
* = no water access

Field Survey Site	Site Description	Air Temperature (°C)	Water Temperature (°C)	Average Depth (m)	Average Width (m)	Secchi Tube (m)
1	FM 147 @ Steele Creek	34.5	26.5	0.30	4.36	*
2	LCR 648 @ Steele Creek	27.0	23.0	0.61	1.65	0.27
3	LCR 656 @ Steele Creek	27.0	24.0	0.00	3.51	*
4	SH 14 @ Steele Creek	28.0	27.0	0.46	2.44	0.29
5	LCR 722 @ Steele Creek	31.0	23.0	0.30	3.17	*
6	FM 2749 @ Steele Creek	30.0	24.0	0.24	2.59	0.58
7	CR 477 @ Steele Creek	32.0	29.0	1.25	14.80	0.16
8	SH 7 @ Steele Creek	33.0	26.0	0.68	4.88	0.11
9	CR 472 @ Steele Creek	30.0	*	0.52	5.70	*
	Total Average	**30.3**	**25.3**	**0.5**	**4.8**	**0.3**

Table 4. Physical characteristics of Riparian Zone and Dominant Substrate of the field survey sites sampled during the Basic Recreational Use Attainability Analysis on Steele Creek, Segment 1209K. Sites 7 and 9 dominant primary substrate is unknown because the site was inaccessible.

Field Suvey Site	Site Description	Left Bank Riparian Zone	Right Bank Riparian Zone	Dominant Primary Substrate
1	FM 147 @ Steele Creek	Pasture/Forest	Pasture/Forest	Mud/Clay
2	LCR 648 @ Steele Creek	Forest/Shrub Dominated Corridor	Forest/Shrub Dominated Corridor	Sand
3	LCR 656 @ Steele Creek	Forest	Forest	Sand
4	SH 14 @ Steele Creek	Forest	Forest	Sand
5	LCR 722 @ Steele Creek	Forest	Forest	Silt
6	FM 2749 @ Steele Creek	Forest	Forest	Sand
7	CR 477 @ Steele Creek	Forest	Forest	Unknown
8	SH 7 @ Steele Creek	Forest	Pasture/Forest	Mud/Clay
9	CR 472 @ Steele Creek	Pasture/Forest	Forest	Unknown

Table 5. Observed evidence of recreational use and impediments to recreational use documented on Steele Creek, Segment 1209K, for the Basic Recreational Use Attainability Analysis. No recreation was observed during the Basic RUAA field surveys. Corresponds to Figure 4

Field Survey Site	Site Description	Impediments	Evidence
1	FM 147 @ Steele Creek	Fence	
2	LCR 648 @ Steele Creek	Fence, Private Property, Log Jams	Fishing Tackle
3	LCR 656 @ Steele Creek	Fence, Private Property, Steep Slopes, No Public Access	
4	SH 14 @ Steele Creek	Fence, Log Jams	
5	LCR 722 @ Steele Creek	Steep Slopes, Log Jams, Large Trash Piles	
6	FM 2749 @ Steele Creek	Fence, Steep Slopes	Foot Prints
7	CR 477 @ Steele Creek	Fence, Private Property, Steep Slopes, Fallen Trees	RV/ATV Tracks
8	SH 7 @ Steele Creek	Fence, Private Property, Debris, Steep Slopes	
9	CR 472 @ Steele Creek	Fence, Log Jams, Barbed Wire	

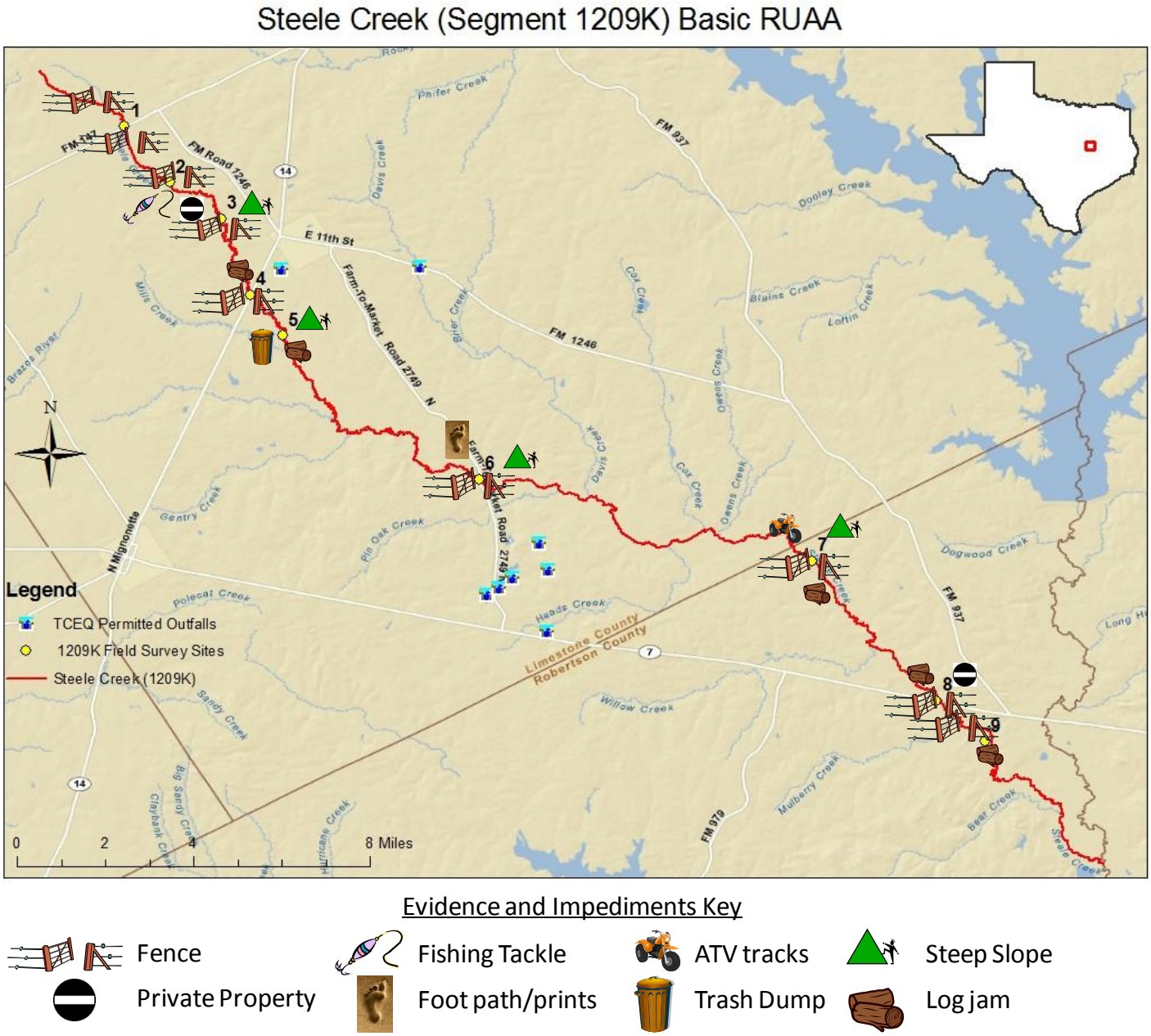

Figure 4. Basic RUAA survey sites on Steele Creek, Segment 1209K, with depictions of observed evidence of recreational uses, and impediments. No observations of recreational uses were documented during the field surveys. Locations are approximate. See Appendix 5: Google Earth Interactive Map for exact locations of uses, evidence, and impediments.

Summary

Nine (9) field surveys were completed on Steele Creek (Segment 1209K) during this basic RUAA to evaluate whether the existing and/or attainable recreational uses of the creek might be different than the current presumed recreational uses. Important data collected in this RUAA included general stream characteristics, observations and evidence of recreational use, surrounding conditions that promote recreation, and surrounding conditions that impede recreation, including channel obstructions.

During the field surveys, staff did not observe any recreational use on Steele Creek (Segment 1209K). Staff did observe evidence of both secondary contact activities (fishing tackle) and non-contact activities (foot prints/paths and ATV tracks). No primary contact recreation was documented during this basic RUAA. Numerous impediments to recreational uses were also noted during the field surveys, including but not limited to fences, log jams, and steep slopes. The average thalweg depth was 0.5m and the average width was 4.8m. The average flow of Cedar Creek during the field survey was 5.4cfs. No public recreation areas in the form of maintained parks were found as part of this RUAA. Basic RUAA summary analysis indicates that secondary contact (1 & 2), and non-contact recreation activities occur on Steele Creek (Segment 1209K).

Literature Cited

Handbook of Texas Online. 2010. Texas State Historical Association (TSHA) web resource: http://www/tshaonline.org.

Texas Commission on Environmental Quality (TCEQ). 2008. Texas 303(d) list (March 19, 2008). TCEQ, Austin, Texas.

Texas Commission on Environmental Quality (TCEQ). 2009. Recreational Use-Attainability Analyses (RUAAs) Procedures for a Comprehensive RUAA and a Basic RUAA Survey. TCEQ, Austin, Texas.

RUAA Summary Form

RUAA Summary

This form should be filled out after RUAA data collection is completed. Use the Contact Information Form, Field Data Sheets from all sites, Historical Information Review, and other relevant information to answer the following questions on the water body.

Name of water body: __*Steele Creek*_____
Segment No. or Nearest Downstream Segment No.: ____*1209K*_____
Classified?: __*No*_____
County: _____*Limestone and Robertson*_____

1. Observations on Use
   a. Do primary contact recreation activities occur on the water body?
      ☐ frequently ☐ seldom ☐ not observed or reported ☐ unknown

   b. Do secondary contact recreation 1 activities occur on the water body?
      ☐ frequently ☐ seldom ☐ not observed or reported ☐ unknown

   c. Do secondary contact recreation 2 activities occur on the water body?
      ☐ frequently ☐ seldom ☐ not observed or reported ☐ unknown

   d. Do noncontact recreation activities occur on the water body?
      ☐ frequently ☐ seldom ☐ not observed or reported ☐ unknown

2. Physical Characteristics of Water Body
   a. What is the average thalweg depth? __*0.5*__meters

   b. Are there substantial pools deeper than 1 meter? ☐ yes ☐ no N/A

   c. What is the general level of public access?
      ☐ easy ☐ moderate ☐ very limited

3. Hydrological Conditions (Based on Palmer Drought Severity Index)
☐ Mild-Extreme Drought ☐ Incipient dry spell ☐ Near Normal ☐ Incipient wet spell ☐ Mild-Extreme Wet